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**To:** Examiner Thangavelu**From:** David C. Goldman

Group Art Unit 2123

**Docket No.** RD-27,376**Fax:** 703-872-9306**Pages including this sheet:** 8**Phone:** 703-305-0043**Date:** June 4, 2004**Re:** US Patent Application Serial Number 09/578,095**• Comments:**

Examiner Thangavelu,

Enclosed is a response to the final office action dated March 4, 2004 for US Patent Application Serial Number 09/578,095. This is a formal communication intended for entry.

If you have any questions please contact me.

Thank you,

David Goldman

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Serial No. 09/578,095

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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Aragonés et al.

Serial No.: 09/578,095

Group Art Unit: 2123

Filed: May 25, 2000

Examiner: Thangavelu

Title: System And Method For Predicting  
Timing Of Future Service Of A Product

Response to Paper No.: 6

REQUEST FOR RECONSIDERATION

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 2213-1450

Sir:

Applicants carefully considered the Final Office Action mailed on March 04, 2004. In response to the Final Office Action, Applicants submitted a Petition To Withdraw The Finality Of An Office Action Under 37 CFR §1.181 on May 4, 2004 as being premature. As noted in the Petition, Applicants do not believe that the Amendment in Paper Number 4 necessitated a new ground of rejection. Accordingly, Applicants requested that the Technology Center Director withdraw the finality. In order to be responsive to the Final Office Action, Applicants submit this response and request that

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the Examiner further examine and reconsider the present patent application in light of the following remarks.

The drawings were objected to for having unacceptable top and left margins. Applicants will submit corrected drawings upon receiving a notice of allowance.

The Examiner rejected claims 1-3, 5-6, 22, 23, 25-26, 42, 43, 45-46, 62, 63 and 65-66 under 35 USC §103(a) as being unpatentable over Kaminsky et al. ("A Monte Carlo Approach To Warranty Repair Predictions") in view of Cribbes ("Changes In Engine Maintenance Management") and further in view of Endrenyi et al, Butler ("AN expert system based Framework for an incipient failure detection and preventive maintenance system"), Wang (U.S. Patent Number 6,230,095) and Husseiny (U.S. Patent Number 5,210,704).

It is respectfully submitted that the Applicants' invention as recited in independent claims 1, 22, 42 and 62 and claims depending therefrom, is not obvious in view of the applied references, taken either individually or in combination. Applicants respectfully submit that the applied references do not teach, suggest, or disclose (either individually or collectively) the independent claims 1, 22, 42 and 62 recitation of "means for performing a deterioration rate analysis that determines performance deterioration rate of the product from the plurality of service and performance information, wherein the performing means comprises a statistical analysis script that relates a subset of the plurality of compartments of the product according to time, wherein the statistical analysis script generates an estimated deterioration rate curve for a subset of the plurality of compartments of the product, wherein the performing means further comprises means for transforming each estimated deterioration rate curve for a compartment to a performance life distribution."

Kaminsky discusses existing approaches to model single and multi component repairable systems for assessment of prospective warranty expenditures. Kaminsky does not disclose means for performing a deterioration rate analysis of a product from a plurality of service information and performance information and transforming each estimated deterioration rate curve for a compartment to a performance life distribution.

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In addition, Kaminsky does not provide a motivation suggesting the desirability of predicting the timing of a future event of a product based on both time to failure distributions and performance distributions. Applicants carefully reviewed the material in Pg 1, Abstract, Pg 2, CL2, Para 3 and 4 cited by the Examiner and submit that these sections fail to provide a motivation suggesting the desirability of predicting the timing of a future service event of a product based on both time-to-failure distributions and performance life distributions. Instead, the material in Pg 1, Abstract, Pg 2, CL2, Para 3 and 4 merely discusses approaches to model single and multi component repairable systems for assessment of warranty repair predictions based only on time to failure distributions.

Further, there is no motivation in Kaminsky to combine it with Cribbes, Endrenyi, Butler, Wang or Husseiny. Cribbes is a survey paper discussing changes in engine maintenance management. In addition, Cribbes provides an overview of existing engine maintenance practices and discloses types of information that may be used to reduce engine maintenance cost. Cribbes does not disclose means for performing a deterioration rate analysis to determine performance deterioration rate of a product from a plurality of service and performance information. Applicants carefully reviewed the material in Pg 9, CL1, Para 3 and 4 and submit that these sections fail to teach a performance deterioration rate analyzer that analyzes performance deterioration rate for a product from a plurality of service and performance information. Instead, the material in Pg 9, CL1, Para 3 and 4 merely discusses types of information that may be used to reduce engine maintenance cost, like history of key engine parts and engine on wing history. In addition, Cribbes does not disclose means for transforming each estimated deterioration rate curve for a compartment to a performance life distribution.

Endrenyi proposes a probabilistic model that provides a quantitative connection between reliability and maintenance. Butler discusses an expert system based incipient failure detection and predictive maintenance system for a distributed system. Both Endrenyi and Butler (taken either singly or in combination) do not suggest means for performing a deterioration rate analysis of a product from a plurality of service

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information and performance information and transforming each estimated deterioration rate curve for a compartment to a performance life distribution. In addition, both Endrenyi and Butler (taken either singly or in combination) do not suggest the desirability of predicting the timing of a future event of a product based on both time to failure distributions and performance life distributions derived from deterioration rate curves.

Wang discloses a system and method for cylinder power imbalance prognostics and diagnostics. Wang does not teach a statistical analysis script that generates an estimated deterioration curve for the subset of compartments of the product. Applicants carefully reviewed the material in the Abstract and CL2, L22-37 cited by the Examiner and submit that these sections do not disclose a statistical analysis script that generates an estimated deterioration curve for the subset of compartments of the product. Instead, the material in the Abstract and CL2, L22-37 teaches that the rate and magnitude of deterioration of an engine is indicated by a trend parameter. An indication of deterioration through the use of a trend parameter is not analogous to estimating deterioration rate curves for a subset of compartments. Also, Wang does not suggest means for performing a deterioration rate analysis of a product from a plurality of service information and performance information and transforming each estimated deterioration rate curve for a compartment to a performance life distribution. In addition, Wang does not suggest the desirability of predicting the timing of a future event of a product based on both time to failure distributions and performance life distributions.

Husseiny relates to a wearout monitor for failure prognostics to predict incipient failure in rotating mechanical equipment. Husseiny does not teach a simulator for simulating a distribution of future service events of the product according to performance life distributions. Applicants carefully reviewed the material in CL2, L7-32; CL5, L53-57 and CL13, L8-46 referenced by the Examiner and submit that these sections fail to disclose a simulator for simulating a distribution of future service events of the product according to performance life distributions. Instead, the material in CL2, L7-32; CL5, L53-57 and CL13, L8-46 discusses the use of information from sensors to identify existing deterioration or abnormalities to predict future trends in performance such as

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anticipated failures. Also, Hussein does not suggest means for performing a deterioration rate analysis of a product from a plurality of service information and performance information and transforming each estimated deterioration rate curve for a compartment to a performance life distribution. In addition, Hussein does not suggest the desirability of predicting the timing of a future event of a product based on both time to failure distributions and performance life distributions.

Therefore, Applicants respectfully submit that nowhere do the applied references taken either singly or in combination discuss the desirability of predicting the timing of a future event of a product based on both time to failure distributions and performance life distributions. In addition, Applicants submit that the combination of Kaminsky in view of Cribbes and further in view of Endrenyi, Butler and Wang and Hussein does not suggest means for performing a deterioration rate analysis of a product from a plurality of service information and performance information and transforming each estimated deterioration rate curve for a compartment to a performance life distribution. Furthermore, Applicants submit that it would not have been obvious to one of ordinary skill in the art at the time of the invention to use performance life distributions in addition to time-to-failure distributions to simulate a distribution of future service events, in light of the teachings provided in the combination of Kaminsky in view of Cribbes and further in view of Endrenyi, Butler and Wang and Hussein.

Applicants submit that obviousness cannot be established absent a teaching or suggestion in the prior art to produce the claimed invention. To establish a *prima facie* case of obviousness, Applicants submit that the Examiner should set forth the differences in the claim over the applied references, set forth the proposed modification of the references, which would be necessary to arrive at the claimed subject matter, and explain why the proposed modification would be obvious. Furthermore, Applicants submit that the mere fact that references may be combined or modified does not render the resultant modification or combination obvious unless the prior art suggests the desirability of the modification or combination.

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As stated above, nowhere do the applied references teach, suggest or disclose means for performing a deterioration rate analysis that determines performance deterioration rate of the product from the plurality of service and performance information, means for generating an estimated deterioration rate curve for a subset of the plurality of compartments of the product and means for transforming each estimated deterioration rate curve for a compartment to a performance life distribution. In the Applicants invention, real time performance data is used to perform a deterioration rate analysis to determine performance deterioration rate of a product. The use of real time performance information in addition to service information to simulate a distribution of future service events as disclosed by the Applicants' invention enables the modeling of the service requirements of a repairable system at run-time. That is, decisions of future service requirements of a product may be based on real time performance information (in addition to service information), thereby causing fewer future service requirements for the product. Such an approach leads to better cost projections, more realistic and effective risk management, day-to-day service that is more responsive to customer needs and higher long-term contract profitability.

Applicants submit that it is improper to use the claimed invention as an instruction manual to piece together the teachings of the prior art so that the claimed invention is obvious. "It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious. . . . '[O]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.'" *In re Fritch*, 23 U.S.P.Q.2d 1780, 1784 (Fed. Cir. 1992).

Since the combination of Kaminsky, Cribbes, Endrenyi, Butler, Wang and Husseiny does not disclose or suggest means for performing a deterioration rate analysis that determines performance deterioration rate of the product from the plurality of service and performance information, means for generating an estimated deterioration rate curve for a subset of the plurality of compartments of the product, and means for transforming each estimated deterioration rate curve for a compartment to a performance life



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distribution as set forth in claims 1, 22, 42 and 62, Applicants submit that these claims are patentably distinguishable over the combination. Thus, Applicants submit that the Examiner has failed to provide a basis in the art for combining the applied references that would support a *prima facie* case of obviousness. Accordingly, Applicants respectfully submit that the claimed invention, as recited in now presumably allowable independent claims 1, 22, 42 and 62 define allowable subject matter over the applied art. Withdrawal of the rejections is respectfully requested, and allowance of claims 1, 22, 42 and 62 is respectfully solicited. Claims 2-3, 5-6; 23, 25-26; 43, 45-46; and 63, 65-66, depend directly or indirectly from claims 1, 22, 42 and 62 and are therefore similarly patentable by dependency. Accordingly, Applicants request that the Examiner reconsider and remove the §103(a) rejection of these claims.

In view of the foregoing remarks and amendments, Applicants request that the Examiner reconsider this application and allow claims 1-6, 9-16, 20-26, 29-36, 40-46, 49-56, 60-66, 69-76 and 80-81.

If the Examiner has any questions regarding the present patent application, the Examiner can call Applicants' attorney, David Goldman, at telephone number (518)-387-5927.

Respectfully submitted,



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David Goldman  
Attorney for Applicants  
Registration No. 34,336

Schenectady, New York  
Dated: June 3, 2004